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Title: Case Study 1 - Los Alamos Last Criticality (1958)

Author(s): Schreiber, Stephen Bruce  
Clark, David Lewis

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# Case Study 1 - Los Alamos Last Criticality (1958)

Steve Schreiber/David Clark

Actinide Operations/National Security Education Center

LA-UR-21-XXXXX

# Agenda

1. Background
2. Simply Difficult Video – “Cecil Kelley Incident”
  - What is accurate?
  - What is missing?
3. References
  - LA-13638 *A Review of Criticality Accidents – 2000 Revision*
4. What changed as a result?
  - Around the world
  - Across the Complex
  - At Los Alamos

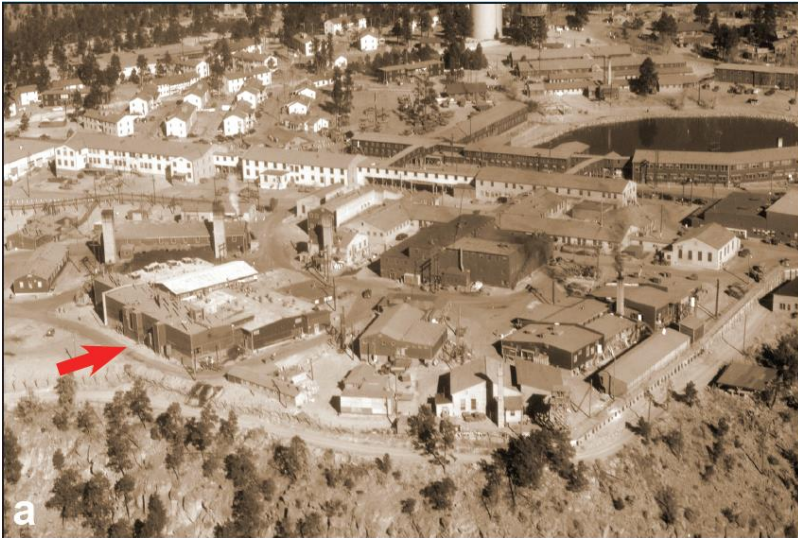


# Background



# Los Alamos Scientific Laboratory

- DP Site at Technical Area 21 (TA-21)
- Plutonium facility operational 1949-1978
- Cold War ongoing

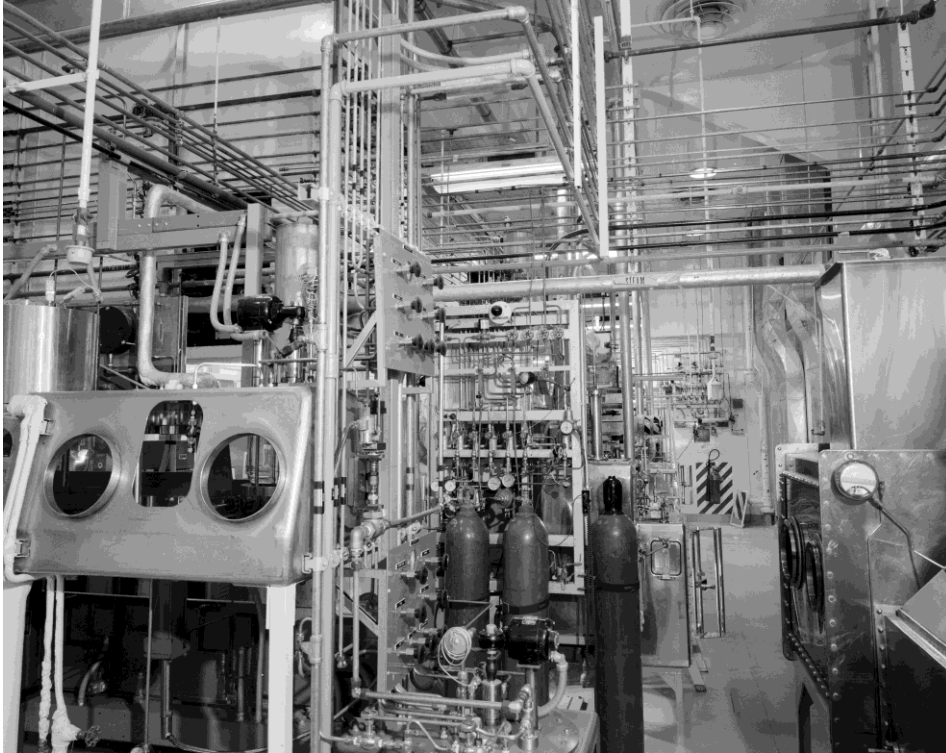


# TA-21 DP Site in the 1950's





# TA-21 DP Site north - plutonium operations







Credit:  
Ben Brooksbank



# What is accurate? What is missing?

- Los Alamos was the US nuclear weapons arsenal until 1949
- Mass production using “lower skilled workers”
- Tri Butyl Phosphate (TBP) used in solvent extraction
- Kelley thought he had received an electrical shock from the stirrer switch
- Event occurred on December 30 at ~1635, so between holidays and nearing the end of the normal work day



# What changed as a result of this event?

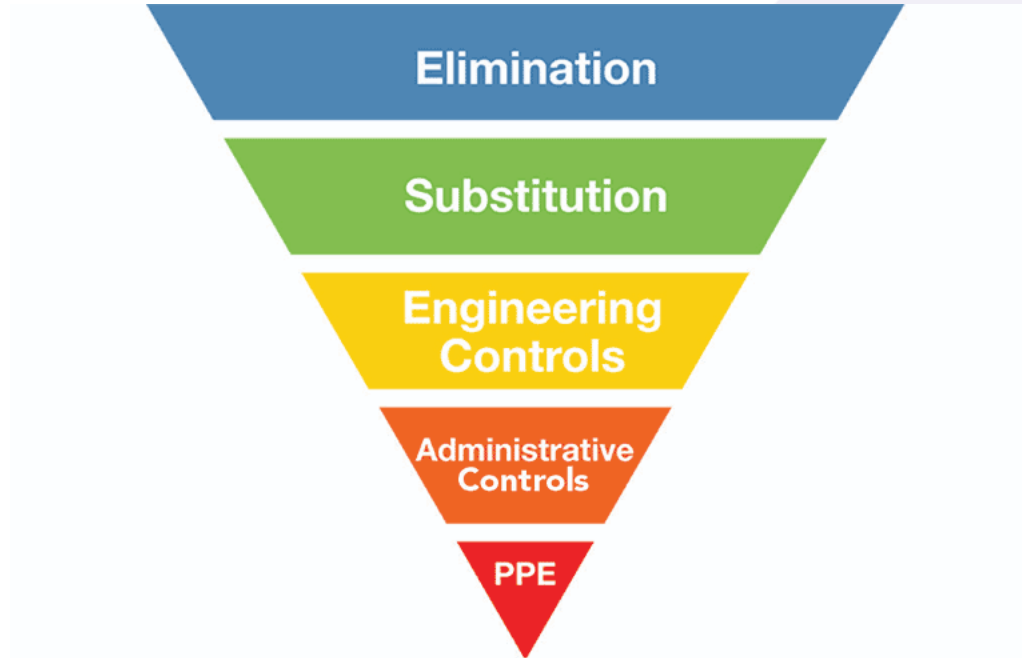


# Prevention through Design (NIOSH/CDC)

- Eliminating hazards and controlling risks to workers to an acceptable level “at the source” or as early as possible in the life cycle of items or workplaces
- Including design, redesign and retrofit of new and existing work premises, structures, tools, facilities, equipment, machinery, products, substances, work processes and the organization of work
- Enhancing the work environment through the inclusion of prevention methods in all designs that impact workers and others on the premises

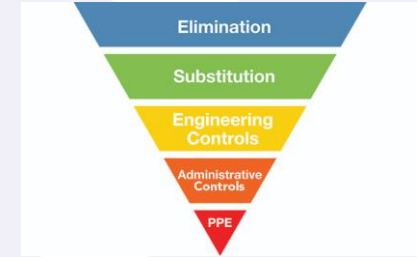


# Prevention through Design (NIOSH/CDC)



# Process equipment and procedures

- Accelerated the transition from administrative controls to engineered controls
- Process equipment designed to be inherently crit safe
  - Pencil tanks for neutron leakage
- Process operations
- Process accountability using analytical chemistry
- Criticality alarm system developed and installed monitoring for excessive gamma radiation

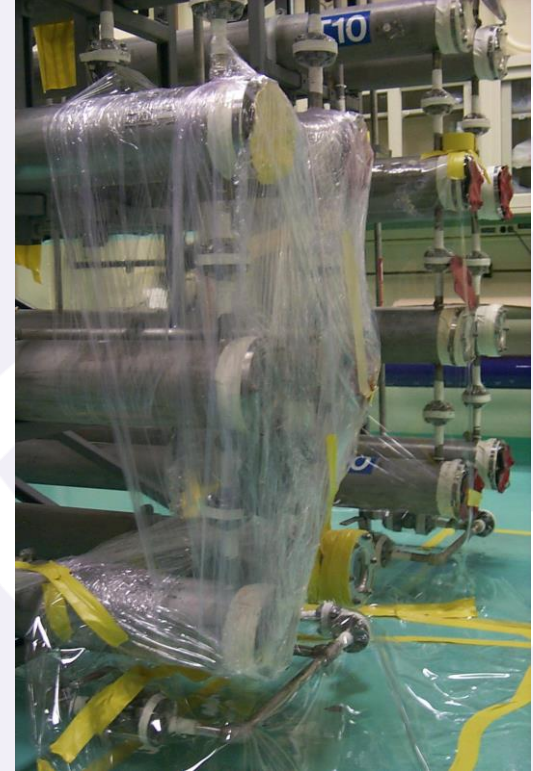


# Gamma alarm

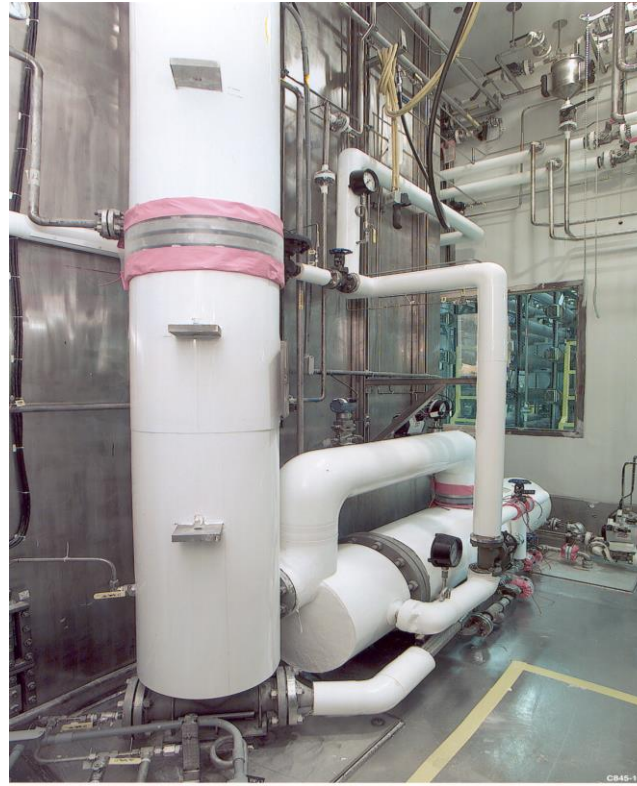
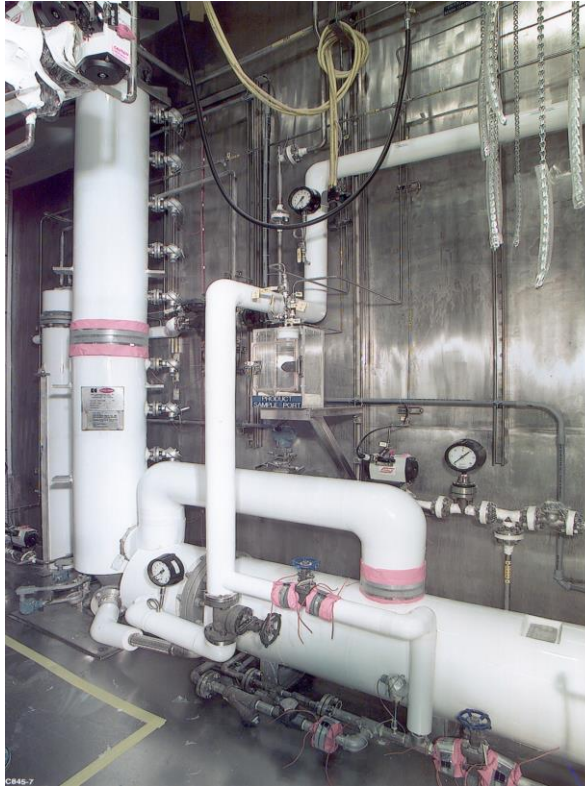




# Pencil tanks



# Nitric Acid Recycle



# Questions?



